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Rockhounds' NATIONAL Magazine

Christmas at Morton Arboretum (See page 7)

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CONTENTS, NOVEMBER-DECEMBER, 1956

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EDITOR'S MEMO PAD

WHILE THE EDITOR'S TASK, be it magazine, club bulletin, or only a column or two in some publication, may at times become a bit onerous, (and this is not exactly a synonym for ornery), yet any editor will tell you that his task may also prove to be very rewarding, or even most fascinating upon occasion.

Many of you may be surprised to know that one of the greatest pleasures that comes to "Ye Editor" is the privilege of looking over some one or more of the many Earth Science Club Bulletins which the mail man drops on our desk almost daily. We frequently marvel at their excellence, and the skill and originality that go into their makeup.

In the Midwest Federation alone, there is often sufficient good editorial material monthly to supply copy for several magazines such as ours —articles of every kind, many of them deserving of much wider circulation than the hundred or more readers supplied by their small mailing list. Furthermore we note that most club bulletins are constantly improving. True, all of them at times have their "ups and downs," due temporarily to changes in their editorial staff, or a slump in the quantity or quality of the copy material turned in, but for the most part they soon come back again to their former state.

In this regard we would urge every club member to get behind the bulletin editor and "roll in the copy." It is most discouraging to any editor, to devote many hours of painstaking labor per month on the project, with little or no show of interest on the part of the membership as reward. Remember he works without pay (would you?), and so give him or her a word of appreciation and encouragement now and then.

One of the most promising efforts in this particular field of endeavor, is the recent organization of the National Association of Mineral Club Bulletin Editors, sponsored and spearheaded by Mrs. Vivienne Dosse, of Fontana, Calif. We predict that through the efforts of this organization in coordinating the work of the club bulletin editors, that we shall see a marked and continuing improvement in the quality of these bulletins throughout the coming years.

While yet on this subject, we would like to interject just one more thought that we have concerning the value and importance of club publications in general. Sorry to say, there are always "moss-backs" in every organization, including some mineral clubs, who will always come up with the question, "now just what good is our club bulletin anyway?" They will perhaps ask the same question concerning the Federation or this magazine also. "I get no good out of it myself," they will continue, "so why go to all this trouble and expense to keep it going."

Personally, we think that the value of the bulletin is great. In fact there are two sides to its benefits. One is to the club and the other to the individual member. First, it disseminates club news and information to the membership, and thereby holds the club together and creates greater interest in club activities; and second, it gives club members an opportunity to express themselves in writing, which is of considerable cultural value.

Some who have never previously so much as written a single paragraph for print, will hand in a small item, perhaps just as news, and seeing their efforts in print will soon try a short, and then perhaps a longer article, and believe it or not, we have watched these efforts grow to the place where folks who previously thought that they could never write anything worthwhile, have eventually written books, which were both a credit to themselves and the literature of the subject in which they were working.

This we think is alone of sufficient importance to make it worthwhile for every club to get squarely behind the bulletin and its editors. Is it not? Think it over.

* * *

FILMS

"OUR MR. SUN."—The dramatic story of the sun and its significance to human life on the earth is told in a colorful new hour-long film. It is the first of a series of science films being prepared for the Bell Telephone System.

Called "Our Mr. Sun," the first film will be available soon to schools and other groups interested in science. It was produced by Frank Capra, Academy Award winning movie director.

In preparation for several years, "Our Mr. Sun" tells in story form what modern science has learned about the sun. An advisory board of leading American scientists assures the authenticity of the scientific material used in the film.

"We hope that by showing the drama and excitement of science we can, in a modest way, help it to flourish and do even more for people everywhere," said Cleo F. Craig, chairman of the board.

This film should be of great interest to Earth Science Club program chairmen throughout the country, and arrangements for showing may be made through your local telephone manager.

*

"THE GRAND CANYON STORY."—A superdeluxe film, which to our way of thinking has hardly an equal, is "In the Beginning—The Grand Canyon Story," which is a 29-minute color-sound Hollywood production, distributed to schools and clubs by the Socony Vacuum Oil Co.

Of unsurpassing beauty, this film relates the entire geologic story of the Grand Canyon, from the formation of the Earth on down to the present day. The geological accuracy and excellence was insured by its supervision by geologists from the University of Arizona. The film may be booked through the Modern Talking Picture Service, 45 Rockefeller Plaza, New York 20, N. Y.

*

"BONANZA."—Speaking of films, another most excellent one is "Bonanza," an historically ac-

curate narrative of the "gold mining days" in the Rockies of Colorado. Here one sees and lives through one of the most fascinating and exciting periods of the past of the great West. This fine color film is distributed for showing by the Denver Rio-Grande Railroad, (Denver office), which serves that region.

* * *

PERSONS AND EVENTS

We are very happy to announce that our good friend ARTHUR FLAGG, of Phoenix, Ariz., late past-president of the American Federation, has recovered nicely from his recent illness, and is now back at his old job at the Bureau of Mines. Mr. Flagg's illness unfortunately came at a time which made it impossible for him to attend and preside over the meetings of the American Federation at St. Paul last July.

Mr. Flagg's feature article on "Minerals in Full Color," which appears in the current November issue of *Arizona Highways*, (Phoenix, Ariz.), is a masterpiece and perhaps the finest article of its kind yet published. Every rockround should order a copy at once (35c), while they are yet available.

All will agree that it is indeed splendid to hear such good news concerning this very distinguished gentleman.

*

It was the turn of the MINERALORIST SOCIETY OF JOLIET to sponsor the 1956 annual Chicagoland joint picnic and field trip on Sunday, October 7, to the famous Wilmington, Ill., coal strip mines to collect fern and other fossils for which this region is so well known. More than fifty cars and one-hundred and fifty individuals representing seven societies were on hand for the occasion. Some newcomers had beginner's luck and many fine fossils were picked up. Arrangements for the outing were made by Mr. Vernon Jay, president of the Joliet Society.

*

It would indeed, be nice if some of our Midwest rockhounds in the vicinity of or passing through Winona, Minn., would call on "shut-in" R. LOPPROW, whose address is 171 W. 4th St. This would cheer him greatly, and while he has never said so, we are sure that a few duplicates from your overstocked specimens would be a very welcome addition to his collection.

*

From Calvin B. Simmons, president of the COLORADO MINERAL SOCIETY comes the announcement of the dates for the joint Rocky Mountain-American Federation, 1957 National Gem and Mineral Show and convention, which will be held in Denver June 13-16, 1957. This will be the 10th annual convention of the American Federation.

Those wishing information concerning space, booths and other equipment will please write President Simmons, 5541 West 10th Ave., Denver, 14, Colo., promptly as this will be a big show and space will be at a premium. Avoid disappointment by signing up early.

This convention will be of special interest to all members of the American Federation as it was in Denver that the Federation was first organized in 1948, following a preliminary meeting held in Salt Lake City the preceding year.

*

Mineral collecting and gem cutting were once considered a poor man's hobby, but—"my how times have changed"—today a poor man can hardly stay in the hobby, or at least keep up with it. Now we find many people from every walk of life, from every cultural level, and every financial status among its devotees. Doctors in large numbers have long been known to be keen about the hobby, as have many other prominent people.

Now we have at least one U.S. SENATOR, BOURKE HICKENLOOPER, of Iowa, who has taken up gem cutting as a hobby, and Mrs. Hickenlooper has given him a new gem cutting outfit. The senator is practicing up on the art of polishing gem stones in their basement work shop. "It's an interesting form of relaxation," Hickenlooper says, and he has another hobby too—checkering and fitting gunstocks.

*

Since our last issue the "Fabulous Gem Show," of the EASTERN FEDERATION OF MINERALOGICAL AND LAPIDARY SOCIETIES, was held in Baltimore, Md., on the 27th, 28th and 29th of September. All gems were displayed at the Hotel Emerson. Gems and minerals from all over the world, said to be valued at more than one million dollars, enthralled thousands of guests who visited the show. Official host club was the Gem Cutters Guild of Baltimore.

One of the most fascinating exhibits were the 5,250 carat blue sapphire and 4,700 carat golden crystal from Burma. Also on display was the well-known Wyoming jade carving of Donal Hord, weight 104 lbs.! The world's most extensive collection of clam pearls from Maryland waters was borrowed from Mr. Hans O. Schilling of Salisbury, Md., and placed on exhibition. Mr. Howard B. Graves of Lakeland, Fla., was elected Federation president for the ensuing year.

* * *

IN MEMORIAM

The Midwest Federation, as well as the mineral fraternity throughout the entire country, lost one of its most ardent supporters and enthusiasts upon the sudden death of HALVER R. STRAIGHT in his home at Adel, Ia., on Friday, September 28, 1956.

"Hal," as he was affectionately known by his thousands of friends, was born in 1884 in Illinois, but moved to Iowa with his parents at the age of 10. He attended Grinnell College and was graduated from the University of Illinois in 1907 as a mechanical engineer. In the university he also took all of the geology courses available.

Mr. Straight was primarily an industrialist and an inventor, having several important inventions to his credit. In his avocation, as a hobbyist he followed both archeology and the earth science

arts, and his collection of fine minerals, fossils and Indian artifacts, which he housed magnificently in a 20 by 35 foot museum in the basement of his home, in Adel, was one of the finest and most valuable private collections that we have ever seen. He specialized in fossilized woods, and was considered to be an authority in this particular field. His fine exhibit of petrified woods at the St. Paul Convention will never be forgotten by those who saw it.

He was one of the organizers of the Central Iowa Mineral Society, of Des Moines, and a past president of the Midwest Federation, contributing much of his time and energy working for its welfare as organizer and a member of the executive committee. During his presidency he promoted and directed our Houghton (Michigan) Field Convention almost single handed. He was a life subscriber and supporter of EARTH SCIENCE, and his loss will be felt very keenly by all of us. He was buried in the Glendale Cemetery, Des Moines.

*

That Grand Old Timer and editor of *Ye Old Timers' Mineral Bulletin* is no longer with us. PAUL VANDEREIKE passed away on August 1, 1956, after a serious illness which began on July 24. He was born in Wisconsin on October 2, 1870, and received his B. A. degree in geology from the University of Wisconsin.

After a long and distinguished teaching career, largely in the schools of California, he retired in 1949 from the city schools of Bakersfield, where he had served for 36 years, and was chairman of the science department.

For more than eleven years he was editor and publisher of *Mineral Notes and News* (now *Gems and Minerals*), the official publication of the California Federation. In 1951 he founded *Ye Old Timers' Mineral Bulletin* and was its editor until the time of his death.

The following poem, written by Paul himself, conveys his philosophy of passing:

There is no death. Our passing is
In fact a metamorphosis—
A blend from life into a dream.
Our loved ones go from where they fought
To higher plains, as Jesus taught,
Where love and truth prevail supreme.

We must not mourn, or wish them back,
Or curse our luck or grieve our lack.
"Thy will, not mine" is always best.
Tho' tears will come as come they must,
Be brave, and place in Him our trust
Who summons all to final rest.

* * *

"RECREATION is intended to the mind as whetting is to the scythe, to sharpen the edge of it, which otherwise would grow dull and blunt. He, therefore, that spends his whole time in recreation, is ever whetting, never mowing; his grass may grow, and his steed starve: as contrarily, he that always toils and never recreates, is ever mowing, never whetting; laboring much to little purpose. As no good scythe has no edge. Then only does the work go foreward, when the scythe is so seasonably and moderately whetted, that it may cut, and so cuts, that it may have the help of sharpening."—BISHOP HALE, in the *Saturday Magazine*, of July 5, 1854.

* * *

LETTERS

DEAR MR. WILSON:

Enclosed is my check to renew my subscription to EARTH SCIENCE magazine. Please be sure to send me the September-October issue, as I want to know the results of the show in Saint Paul.

The show at the convention last month was the first gem and mineral show that I have ever attended, but you may be sure it will not be my last. I thoroughly enjoyed every minute of it.

The Minnesota Club should be very proud and happy to have had such a successful show.

Sincerely,
MRS. W. H. STEINBUNNER

*

DEAR MR. WILSON:

Dr. Barlow's story of "Bizarre Forms of the Eastern Sahara" in your September issue was charming, and so were his pictures. I loved the little "Dohomey Girl" used as a frontis picture, and there was only one thing sadly lacking. Perhaps the bizarre maiden would have been ever more charming had she not forgotten her brassiere,—or would she?

Anyway, we enjoy your little magazine very much,—it is so easy to read, and we would loathe to be without it. We look forward to the coming of each new issue.

Sincerely,
R.F.M.

* * *

AUTHORS

MRS. JUNE CULP ZEITNER and her husband, of South Dakota, are a rockhound partnership of distinction. GEORGE A. MALOTT is chairman of the archeology division of the Midwest Federation. HENRY H. BARTON, IV, is of the fourth generation of the family operating the mines in the Adirondacks whence come the Gore Mountain garnets now used as abrasives. KENNETH ROBERTS, of Kennebunkport, Me., has taken time off from writing the adventure stories that have won him international renown, to write of his own adventures in the field of dowsing. ROBERT E. RIECKER, of Boulder, Colo., presented his paper at the University of Colorado. FRANK H. WASKEY, rightfully known as "The Grand Old Man of the Far North," has spent the greater part of his life in Alaska, much of it beyond the Arctic Circle, and is known and respected by rockhounds throughout the entire country. He has just returned from a long collecting trip through Alaska, and has brought back with him many rare and choice specimens not elsewhere available. Among other items, two of the interesting "masqueraders" are offered for sale in his classified ad in this issue of EARTH SCIENCE.

* * *

COVER

Life really gets rugged for the rockhound when winter spreads its mantle of snow over the land. Of course, most people in this great fraternity are busy in their basements during the Christmas season grinding out gems for Christmas presents. But not the hardy souls shown in our cover picture, who are hopefully searching the stream bed in Morton's famous arboretum. Such activities, however, have their compensations. A brisk walk through the woods brings roses to the cheeks and an appetite worthy of a Christmas dinner.

This arboretum, created by the Morton family, famous for publicizing the mineral halite, is known far and wide for its wonderful contribution to the study of nature. Located about thirty miles west of Chicago, near the town of Lisle, it contains about every type of tree and bush that can be induced to grow in that area.

Classes in nature study have been conducted there for many years, instructed by experts in many fields, including rocks and minerals, and channel 11 out of Chicago publicizes a regular series of lectures by arboretum instructors. Do not miss a visit to this famous arboretum, as it is beautiful at any season of the year.

We are indebted to Mr. Ciszewski of La-Grange, Ill., for the beautiful picture of this peaceful Christmas scene. — **W.H.A.**

—BEN HUR WILSON, *Editor*

BOOK REVIEWS

"THE EARTH BENEATH US," by H. H. Swinnerton. Little, Brown & Co., Boston. $5.

This book in a narrative style portrays in sequence events in the origin and development of the Earth as envisioned by scientists through the centuries.

The views of geologists, mathematicians, physicists and others are briefed and combined in non-technical language in a way to hold the reader's interest, while telling the story of how the Earth beneath us came to be as we find it.

Here we learn of the genesis of mountains, volcanoes, geysers; of the causes of earthquakes; of the formation of rocks, ores and precious stones; of the evolution of plants and animals; of the coming of man, and of the dawn of civilization.

The author, H. H. Swinnerton, is an eminent British scientist and educator, who is professor emeritus of geology and geography in the University of Nottingham, England.

— W.H.A.

*

"GOLD IN THE DESERT," by Olga Wright Smith. University of New Mexico Press, Albuquerque. $4.

This book gives an honest account of a genuine experience on the formidable Lechuquilla Desert of southwestern Arizona.

Here is a book that every rockhound should read and profit thereby. This will not be a hard job to do, because it is written in a very entertaining manner, and gives authentic information about prospecting and the many necessary preparations incident to extended sojourn on the desert.

This book debunks much of the joys of prospecting, dwelling at some length, and necessarily so, on the hardships to be endured, including dust storms, insects, wild animals, heat, snakes and other vicious creatures, including tenderfeet. Each time, however, that some particularly bad period is passed, it stresses the joys of the clean open air, the heavenly perfume of the night blooming plants, the relaxing influence of freedom from social pressure, the joys of the sunrise and sunset, the clear sparkle of the stars, the blaze of color of the flowering cactus, etc., until you find yourself longing for the opportunity to experience like events. Do not neglect adding this fine book to your library.

Both Mrs. Smith, the author, and her husband are members of the Central Iowa Mineral Society, of Des Moines, an affiliate of the Midwest Federation, and we are all very proud to claim her as our own.

— W.H.A.

*

The following pamphlets available at the U. S. Government Printing Office, Washington 25, D. C., should be of interest to many of our readers:

No. 31W—Uranium Deposits at Base of the Shinerump Conglomerate Monument Valley, Arizona. Catalog No. 1-19.3: 1030-C. His maps, pp. 99-130 65c

No. 32U—Accuracy of Ore-Reserve. Estimates for Uranium-Vanadium Deposits on Colorado Plateau. P. 131-148, il; 1956, 45c Catalog No. I 19.3: 1030-D

No. 33U—Study of Radioactivity in Modern Stream Gravels as a method of Prospecting. 1956. P. 149-169, il; pl. in picket. Catalog No. I 19.3: 1030-E 25c

No. 34U—X-ray powder Data for Uranium and Thorium Minerals. 1956 P. 91-153. 25c Catalog No. I 19.3: 1036-G.

No. 35U—Geology and Mineral Resources of the Ivanpah Quadrangle, California and Nevada, 1956. 172 P. il. pl., 2 maps in pocket. Catalog—No. I 19.16: 275 $2.50.

16 T. Thorium and Rare Earth Minerals in Powder-Horn District, Gunnison County, Colorado. This report is a result of study made in 1956. Pages 693-723, 2 maps in pocket. Catalog No. I 19.3:1027-O 60c

(Above list was submitted by courtesy of Ruth Stroh, 13 Sherwood Rd., Cockeysville, Md.)

ETHICS FOR ROCKHOUNDS

Collecting areas everywhere are being closed because of the negligence or selfishness of a few of us, who apparently have never heard of the Golden Rule. For the survival of our hobby, we ask each of you to subscribe to the following rules:

1) Do not enter any mine, quarry, or other private property without permission from the superintendent or owner. Offer to pay

for the privilege of entering the property—the offer won't be accepted very often, but the effect will be good.

2) Do close all gates behind you.

3) Do not use or tamper with any tools or equipment at the mines, quarries, or properties you visit.

4) Do observe all limitations imposed by property owners. Be prepared to sign any waiver of responsibility for injury, absolving the property owners. Watch your children.

5) Do not take more specimens from any collecting site than you need for your collection, or for trading purposes. Many collecting areas have been posted because a few people were hogs. A good rule is to remove only the amount you can carry without risking a hernia.

6) Do clean up the premises when you've finished your picnic lunches.

7) Do not be secretive about possible new collecting areas: after all it's God's country.

8) Do keep your hands behind your back when inspecting anyone's specimen. Touch a specimen only if the owner invites you to do so.

9) Do not be reluctant to voice your desires at your club meetings. Your officers will welcome any honest ideas for improving the society. It is axiomatic that the more you contribute to your society, the more you will benefit from it.

10) Do report any gross infraction of these rules to your officers, for the benefit of all.

(Prepared by Philip R. Cosminsky and Paul E. Halter, M. D., for the Mineralogical Society of Washington, D.C., to which organization credit is given for permission to publish.)

On Keeping the Ranks Filled

All groups of people, for whatever purpose they may be joined, suffer constant thinning of the ranks—some move to other communities, some die, others may direct their activities and interests in other directions.

In the field of lapidary work our group (the Minnesota Mineral Club) has felt that it was well worth while to keep the ranks recruited with informed and hence interested, newcomers; not necessarily new members (though they are an important source) but also through renewing and refreshing the appetite for lapidary work among older members.

This is being attempted under Club sponsorship, largely through the efforts of our member W. J. Bingham, who makes lapidary his profession.

The program now under way seems to be accomplishing the desired results to a gratifying degree. It is arranged as follows:

The club holds its regular meetings during winter months on the second Friday of each month, the sessions commencing at 8:00 P.M. The clubroom, however, opens at 7:00 each meeting night and at that time Mr. Bingham goes to work on this project.

He conducts a one-hour lecture-discussion seminar, open to all club members who wish to attend and participate. The subject matter is confined to lapidary work (rather than mineralogy, archaeology, geology, etc.); the meetings are strictly informal, illustrated as may be required by blackboard sketches, and with questions and comments flying back and forth.

An attempt has been made to confine any one session's discussion to the subject for that evening, in the following order: General Discussion, Sawing, Grinding, Sanding and Smoothing, Polishing.

In addition to liberal use of the blackboard, various pieces of material and even the smaller items of equipment are used, examined and discussed.

An especially effective item provided by Mr. Bingham is a small cube of Montana agate. This cube illustrates in a telling manner the need for careful and painstaking sanding preparatory to polishing.

One side of the cube presents a sawed surface; the next side is sawed and ground; the third side is sawed, ground and rough sanded; the next side ends up medium sanded, and finally is a side which is finely and carefully sanded. The "gimmick" is that on half of each of these surfaces, an attempt has been made to put on a polish. This strikingly contrasts the fine polish obtainable on the well-sanded surface with the varying calibres of polish obtainable on the others.

These meetings draw attendance averaging about one-third or more of the members who attend the general meeting. These are presumably the members that are interested in learning something about the subject of lapidary they don't already know, and as such they are the very ones from whom our lapidary enthusiasts must draw new converts.

You don't need an expert gemologist, nor an instructor with an M.A. degree to successfully conduct this type of "class." Anyone in your club who has enthusiasm and liking for the subject, reasonable (no more) knowledge and experience in the work, and the respect of his fellow members, can conduct a course like this with wonderful results.

Try it just one season—it will definitely and measurably raise the calibre of lapidary work produced in your club; it will strengthen the loyalty and increase the interest of your members.—W. H. de Neui, Lapidary Chairman.

Wisconsin Catlinite

There was a time when it was believed that the Pipestone Quarries of southwestern Minnesota were the famous Indian Quarries used by the Chippewa Indians prior to 1850. These ancient quarries, at Pipestone, have long been reserved by governmental decree for the exclusive use of the "Red Men," on account of this traditional belief.

Research conducted by the Disney Studios,

of Hollywood, during the filming of the legend of Hiawatha, indicated that the real ancient quarry was actually located in Barron County, Wisconsin. It was then that the outcropping was found in the Blue Hills of Hardscrabble, some five miles east of Rice Lake. This rediscovery was made about five years ago.

According to Indian accounts, the Barron County quarry once supplied pipestone (catlinite) to all the Tribes in the Great Lakes region, its stone being prized above the more plentiful and plainer stone of western Minnesota. For several generations prior to 1850 the Chippewas used it as one of their principal items of barter.

Because of the ceremonial use of the pipes made of this stone, the Chippewa kept the location of the deposit secret from all but a half-dozen artisans, who quarried and carved it there. In a battle with the Siouxs these artisans were killed, and the site was never found by them again.

An expedition to this famous locality was made on August 12, by members of the Minnesota Mineral Club, under the guidance of field director Urban Ipsen.—*Rock Rustlers News.*

Silicon Comes Into Its Own!

Would you like to make a fortune? Who wouldn't? If so, think this problem over seriously. Perhaps you might be the lucky one to solve it, — should you, fame and fortune await you. One hundred years ago, it happens that the market price for pure aluminum metal was around $100.00 per pound, this in spite of the fact that it was the most abundant metal and third most abundant element in the earth's crust.

This high price was due to the fact that, locked up so tightly in combination with the element oxygen (bauxite), no one had yet discovered an easy or cheap method by which to separate them. Then along came a young science student by the name of Hall who, with skill and imagination, soon devised a way to accomplish the feat electrolitically, whereupon the price became gradually reduced through the years, to where it has sold for as low as 15c per pound.

Today, we are now faced with a similar problem, in regard to the element silicon, the second most abundant element which, until recently, has had little or no value in its free or pure state, but which, at present, in view of important new discoveries, may soon become one of our most valuable and useful industrial materials.

It is now known that appropriately arranged cells of pure refined silicon, when exposed to sunlight, have the power of converting about 11% of this solar energy into electricity, which may be used immediately or, if necessary, be conducted into storage batteries for future use. This is about fifteen times more efficient than any other previous method yet employed for this purpose. Experimentally, this source of electrical energy has already been employed for operating telephones and portable radios, and in certain other fields it holds much promise for future development. This would be especially advantageous in remote parts of the earth, such as desert regions, where distances are great, fuel is scarce, sunshine plentiful, and electrical power otherwise is unavailable.

One of the greatest drawbacks to the expansion of this source of power is the high cost of pure silicon which, presently, is more than $300.00 per pound. Better and less costly methods of separating and refining it will, of course, be necessary before widespread use of this source of electricity can be put into practice.

Here then is your great opportunity. Every rockhound is, of course, very familiar with the ubiquitous mineral quartz, carrying the formula SiO_2—almost a household word like H_2O, which is made up actually (when pure) of only two elements, silicon and oxygen. It is so plentiful that it makes up actually, as quartz, almost 12½% of the earth's crust, and in combination, perhaps 60% more.

Methods of separating these two elements have been known for a long time, but to accomplish the feat and purify the silicon successfully is a difficult task—hence the present high cost of the element. Surely someone will eventually come up with a solution, most probably in the research laboratory of some large industry or university, yet there is always the possibility that some layman or amateur, like Hall, might even contribute some very practical idea that will do the job more efficiently.

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The Petroglyphs of Hoop Up Canyon

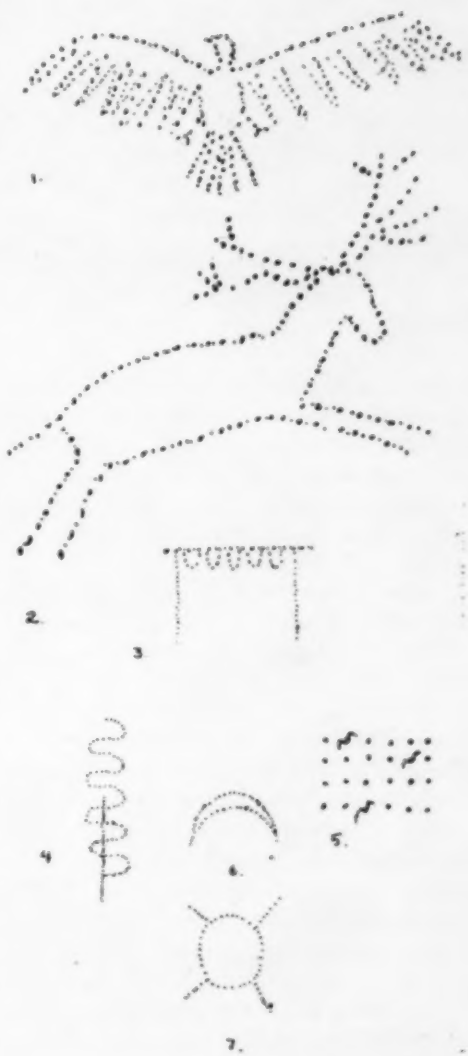
by JUNE CULP ZEITNER

IN THE WESTERN BLACK HILLS lies a remote but picturesque canyon known as Hoop Up Canyon. On the steep sandstone wall some long vanished race has left a record of its interests and activities in the form of a remarkable series of petroglyphs. The artists who pecked out these pictures on the cliffs showed talent enough to excite an art lover, and the story the pictures tell excites the interest of anthropologists and historians.

Until the modern uranium rush this area was little known to civilization. Now, however, jeep trails are everywhere and the trail of the prospector has followed the trails of the ancient Indians. This canyon, was visited in July, 1939, by Mr. Ernest Hoffman and Mr. Guy Wickard, who excavated a cave in the canyon which showed evidence of habitation. Arrowheads, metates, stone knives and awls were found in the small cave, which measures 10′ x 6′ x 15′.

We had not seen the petroglyphs in Hoop Up until 1945, although we had seen the more famous petrogylphs and pictographs in Craven and Red Canyons to the south. Wendell Bever, South Dakota big game biologist, expressed the desire to see Hoop Up, and invited my husband Albert and me to go along.

When we first entered the canyon we were all thinking of pictographs, as our descriptions of the place had been hazy Pictographs are often drawn in bright colors on a large scale and are thus more readily visible than the petroglyphs, which



are chiseled or pecked out of the native stone. We drove nearly as far as the trail is passable and failed to see anything of interest. So we stopped the car not far from the cave and Wendell walked over to the west cliffs, which rose vertically from the grassy pine-clad valley. Albert and I were busily speculating about where we had missed directions, when Wendell let out such a whoop that I was sure Hoop Up had taken on the wrong spelling somewhere along the line.

We walked over to the wall and the first thing we spotted was a delicateley chiseled petroglyph of a giant running elk. *(Fig. 2.)*

Although the style of the design would earn it the label of primitive in art, there was a definite feeling of motion, and the proportions, rhythm and balance were harmonious. Elk are not common in this area now although some parts of the Hills still have a few. Next we saw a deer in outline. Since this was in a completely different style we concluded that not one but several artists had used this cliff as their "canvas."

Now with growing enthusiasm we explored the canyon on foot. Wendell and Albert got way ahead of me in their eagerness to find the number and extent of the petroglyphs. while I happily loitered along trying to figure out the meaning of various abstract patterns.

Animal portraits were the most common. Among other animals were bear and buffalo no longer found wild in this region. There was one bird, *(Fig. 1.)* a large bird on the wing, very likely an eagle. There were also several snakes, although the liknesses of the reptiles were much more stylized than the other forms.

One of the most interesting masterpieces on display was a family group of deer, papa, mama, and the little fawn. There were animal tracks pecked out of the Lakota sandstone, and trees and plants. These were all geometric in pattern.

In a place like this omissions are almost as interesting as the actual carvings. There was no attempt to represent man, dwellings, or any kind of fish.

Albert and Wendell reported that the drawings extended for a good quarter of a mile from north to south. The cliff varies in height from about 50 feet to 100 feet. While most of the petroglyphs were about 3 to 5 feet up from the base, many were high enough that one wonders what the primitive artists stood on to complete their designs.

Among the abstract patterns was an intriguing arrangement of 26 dots, which I wondered about for a long time. *(Fig. 5.)* There were four rows of six dots each, evenly spaced and with wavy lines, drawn at random, apparently, through three dots. Was this a computation of time? An appraisal of enemy forces? A game? Or some meaning we could not even fathom?

Another intriguing pattern looked like a string of beads balanced on two poles. *(Fig. 3.)* The Indians used to dry venison on a stick set up on poles. Perhaps this was a geometric view of "jerked meat."

There was a picture of the sun, *(Fig. 7.)* and what looked like a four-pointed star. Another design could have been the moon, *(Fig. 6.)* a tusk, the curve of a river, a sea shell, or a horse shoe, depending on how far your imagination takes you.

An odd geometric pattern resembled a rope precisely coiled, with a stick reaching from the bottom to the exact center. *(Fig. 4.)*

By far the most fascinating thing in the whole canyon was discovered accidentally by Wendell and Albert. The terrain is exceedingly rugged and since there had been recent moisture the gumbo like soil was slippery. While trying to find sure footing around some of the giant boulders the men had to crawl around one huge chunk of sandstone maybe 6′ x 8′ x 10′ in size. There under the sloping top of this sandstone were more beautifully preserved animal pictures. This rock had broken off the main cliff so long ago that full grown pine trees were growing on the

grassy sod on top of it. But when the Indian artists were busy at work this pine-topped giant was part of the canyon wall.

As we marveled at this newest find we were suddenly aware of the silence and isolation of this spot. There was a feeling of timelessness about it, as if only yesterday the Indians had dropped the tools of their avocation and moved on.

As museum owners we were tempted to bring the "flying" elk home with us for our American Indian collection, but we left the spot undisturbed, hoping others will do the same. In fact, this spot has recently come to the attention of the Park Service and it is likely the government will help preserve for future generations the record of the past as shown in Hoop Canyon.

The Zeitners on a Hill Overlooking the Entrance to Hoop Up Canyon, Wyo.

INANIMATE MASQUERADERS

Some years ago, a number of stories appeared in various mineral magazines about the then newly-found Arctic Ocean Calcites. In one of these stories there was a quotation from "Getting Acquainted with Minerals," George L. English: "In many ways the study of Calcite will give us much pleasure, for its crystals are more varied than those of any other mineral." Calcite not only has its own varied crystal forms, but it assumes forms of many other minerals.

In the case of Arctic Ocean Calcites, it has been stated by well informed crystallographers, that their many forms are all Pseudomorphs after Glauberite. However, Mrs. May Kennedy of Blackwell, Okla., than whom there is no more observant and analytical collector, says that several of the forms assumed by these particular Calicites do not occur in glauberite, but do occur in marcasite, notably the beautiful cocks-combs.

Not only do these calcite aggregates from under the ocean vary greatly in their crystal forms, but they occur in a wide range of color, from gray through yellows and browns to black. When gray, and with fore-shortened recumbent crystals, an aggregate strongly resembles a cluster

of small molluscs—an instance of a mineral "masquerading" as one of the animal kingdom.

The writer presently is seeking identification of an organism that when living is attached to the floor of the Bering Sea littoral. Storms sometimes tear away these plants or animals from their habitat, and cast them on the beach. When dried by sun and wind they appear to be coral colored pisolitic mineral.

—FRANK H. WASKEY

GORE MOUNTAIN GARNET

by HENRY H. BARTON, IV

FROM A JEWELER'S INTEREST in some pretty red stones grew a business, the Barton Mines Corporation, which is the world's major producer of abrasive garnet, and which, at 80 years, must be one of the oldest existing mineral enterprises in the United States.

Henry H. Barton, a young Englishman working for a Boston jeweler, had first seen the gem garnets when they were brought in by a salesman. He later moved to Philadelphia, married the daughter of Charles Baeder, America's first successful sandpaper manufacturer, and became plant manager of the family firm of Baeder, Adamson & Co.

But in 1876 he opened his own business in woodworkers' supplies and abrasives, and prospered as growing post-Civil war industries came to him for sandpaper. Recalling the garnets he had seen years before, he did some detective work and finally ran down the deposit near North Creek, N.Y., in the Adirondacks. From a chunk of garnet brought in by a friend, he made the first garnet paper. It was welcomed by the woodworkers in Philadelphia; so Barton got an option on the Gore mountain deposits and began the regular manufature of garnet paper.

Gore Mountain is a vast, pre-Cambrian mass formed under pressures of 375,000 pounds to the square inch and temperatures of 2,200 degrees Fahrenheit about a half billion years ago and 60 miles beneath the surface of the earth. It is composed of feldspar, dark green hornblende and the garnet, which occurs in rounded masses surrounded by a shell of the hornblende. The garnet is the variety known as almandine, which is the deep red iron aluminum garnet. Almandine gets its name from the town of Albanda, in Asia Minor, and garnet comes from the Latin granaticus, the red seed of the pomegranate. The garnet masses are shattered and laminated from the great pressure under which they were formed, so that they split into tiny pieces with sharp edges, which have and keep a keen edge when used as an abrasive.

It is not generally know among amateur lapidaries, but from the Gore mountain deposit comes excellent gem rough. The company makes no effort, however, to separate the gem material or to market it.

Barton leased the Gore mountain site in 1878 and bought it nine years later. In those days workmen gathered the weathered-out garnet nodules in the summer months and put them in bags. The bags were sent down the mountain side 2,600 feet by sled over the heavy winter snows to the railroad station at North Creek.

A mill was built on Gore mountain in 1923. With it went up a small city, with its own power and water supplies, and a costly road was built five miles up the mountain side. The garnet ore is blasted loose from benches cut every 30 feet in

OPERATIONS IN THE LOWER PITS, BARTON MINES, NEAR NORTH CREEK, N.Y.

the deposit, which is 100 feet deep, a mile long and 400 feet wide. After crushing, the ore is processed in a heavy media of ferro-silicon in water. The garnet sinks and the gangue or waste rock is floated off. Pulsating jigs, a screen device operating in a tank of water, and a flotation process in which the garnet is floated off in the froth, are also used to separate the garnet from the waste rock.

The garent is graded with silk screens and by sedimentation in water. After grading, some sizes are heat treated in a revolving kiln to harden the grit and to make it adhere better to the paper.

In 1942, the Barton Mines Corporation, which had been separated from the sales division, built a plant to produce garnet powder for the grinding of optical lenses. It now claims that 70 per cent of all precision lenses are ground with Barton-made garnet powder. Other major users of the company's products are the wood-workers, plastics and non-ferrous metal working companies, and the makers of nail boards. A curious specialty use is for the removal of the red hulls from peanuts.

Henry H. Barton, IV, of the fourth generation of his family connected with the Gore mountain enterprise, is president of the company, and most of the directors are also descendants of the founder.

RECOMMENDED READINGS

"What is a Fossil," by H. Ladd and R. Brown, June issue of The *Trilobite*. The ancients had fanciful explanations for fossils, but a few made brilliant deductions about the true nature of these mysterious formations.

*

"Emerald," by Clarence La Reau, May issue of *The Template*. Mr. La Reau explores the romance as well as the nature of this beautiful gem.

*

"Believe it or Not—Mad Stones," by Frank L. Fleener, D. Sc., June issue of *MGA*. Because of the unusual properties of this stone, Indian fakirs used it to treat snake bites. Later, in Europe the stone was used as a treatment for dog bites.

"The Seventh Sense"

by KENNETH ROBERTS

FOR THREE HUNDRED YEARS and more, minor scientists have attacked water dowsers, heaping curses on their heads and accusing them of every imaginable form of demonology and witchcraft. Until recently the dowsers had no adequate defense against the attackers, who, as the reality of dowsing was increasingly apparent, became more and more outrageous in their shouts that the Seventh Sense of dowsing is a myth, an old wives' tale, without foundation in fact. When, in "Henry Gross and His Dowsing Rod," they were brought face to face with the evidence of a clearly defined Seventh Sense, and shown to be so closed-minded that they would sacrifice the welfare of the human race rather than admit that they might just possibly be wrong, they grew almost incoherent in their furious contradictions.

I have no quarrel with geologists, engineers, or minor scientists who monotonously reiterate that the Seventh Sense is wholly fantastic and unexplainable. On this point we are agreed. We only disagree with geologists, engineers or minor scientists who contend that the Seventh Sense cannot exist and therefore should not be investigated and put to use.

*

The Seventh Sense, to put it briefly, is the working of a dowsing rod, or its equivalent, in the hands of a competent dowser, on flowing underground water; not on any underground water; not on motionless deposits, such as are punctured by so-called artesian wells, but on water moving in underground rivers, sheets, veins and domes.

The word "competent" must be emphasized, for dowsers vary in quality, as do all living things.

Some doctors are incompetent, just as are some plumbers, presidents, portrait painters, pianists, well drillers, dentists, generals, book reviewers, counterfeiters, authors, water geologists, editors, architects, diagnosticians, cooks, race horses, hunting dogs, husbands, wives and cows.

In the hands of competent dowsers whose Seventh Sense has been trained and sharpened, the rod points not only to water veins and domes over which the dowser is standing, but to water veins and domes at small and great distances from the dowser.

*

I must again explain here the technique used by Henry in long-distance dowsing and in map dowsing. In hunting for a vein (or a dome), when standing in the center or on one edge of a given piece of land, he raises his rod and asks (either silently or aloud), "Where is the vein of water nearest the spot on which I stand?" He then turns slowly, with his rod poised before him. When the rod turns violently forward and downward, he is facing the nearest spot of the nearest vein. Then, unless he wishes to walk to that spot, he asks further questions until he has learned all he wishes to know about the vein.

All of our dowsing ventures, after January 1, 1951, were prefaced by long-distance exploration, and then followed up by pinpointing for accuracy. When Henry dowses a map or a sketch of a piece of land from a distance, the operation is essentially the same, except that the map or the sketch is laid flat on the floor or on a table. Henry first asks whether or not there is a dome or a juncture of veins beneath the property to be dowsed. If the answer is Yes, a ruler is pushed slowly across the map or sketch, while Henry waits with upraised rod, as he would when working above the veins in a meadow.

*

There is nothing about this Seventh Sense

that is in any way related to witchcraft, sorcery, crystal gazing, fortune-telling, the ouija board, the spirit world, fairyland or the Glocca Morra of the Little People.

For example, a large fresco of a water dowser decorates a wall of the city hall of Oslo, Norway, where water dowsing is accepted as a necessary and highly appreciated part of life. The Norwegians know that water supplies can't be found without water dowsers, just as they know that houses can't be built without carpenters or ships sailed without navigators. So in Norway water dowsing is honored, along with Norway's other arts, professions and callings, on the walls of the city hall of the capital.

There are no witches or werewolves depicted on those walls; no ghosts; no worlds in collision; no good or bad fairies; no crystalgazers; no elves, pixies or leprechauns; no ectoplasms; no magicians. But the water dowser is there in bright daylight, big as life and no nonsense about him.

Only in America do minor scientists continue to insist that water dowsing is a hoax and a superstition.

Yet centuries ago American farmers, with no geologists to guide or deride them, located water veins beneath their lands by means of dowsing rods, and hacked their tedious way through rock to make their wells—wells that never went dry. The wells of many ancient New England farmhouses are either on or close to veins—a fact that could not possibly have been accidental. Of necessity they had to be located by dowsers.

When farm populations moved to cities, country folk lost their need for dowsers; they were blinded concerning dowsing. In the same way, fish, sealed in the dark waters of cavernous streams, lose their eyesight. Anyone who abandons or abuses one of his senses may lose that sense.

(NOTE.—These paragraphs are reprinted by permission of the author from the book, "The Seventh Sense," [Doubleday. Garden City, N.Y.] copyright 1953 by Kenneth Roberts and Anna Roberts. They follow a selection in our last issue of some passages of particular interest to rockhounds from the author's book, "Henry Gross and His Dowsing Rod," Doubleday, 1951. —EDITOR.)

"Snakes Alive and Snakes Dead"

REPORTS FROM LAKE GEODE say that 11 rattlesnakes have been killed there this summer, most of them by inmates from the Iowa State Prison who have been living at the park and working on improvements. A small bonus for each snake has spurred the search. All the reptiles were big timber rattlers and exceptionally fat. All the Oldtimers say the number is probably larger than normal.

In the vicinity of Bridgeport, a few miles downstream from the park, rattlesnakes have always been plentiful, nesting among the rock ledges of the little creeks leading to the river. Oldtimers there tell some very tall tales about snakes that could swallow a rabbit, snakes with umpteen rattles and a handful of buttons. Some of the tales may even have been true.

It was here a few years ago that stock from the rodeo was pastured one summer and left in charge of a cowpoke from Oklahoma. He heard a warning whirr near his horse's feet one morning and blew the head off a big rattler with the six-shooter he was wearing. Said the whole business came as a rude surprise to him, for he thought he had left all the rattlers in the world down in his native state, where a huge hunt is staged each year, and had come up to the peaceful pastures of Iowa only to find rattlers here as big as those he left back home.

Another story in this vicinity concerns a huge black snake a few years ago. The snake had a habit of raiding the mangers in the barn on the Genck farm for eggs laid by hens. In one manger it had found an egg and swallowed it whole, creating quite a lump in its middle. Then it found a knothole leading to the next manger and slithered through till the lump stopped it.

In this manger was another egg which the snake swallowed, creating a second lump on the other side of the partition.

Trapped thus by its gluttony it fell prey to the family shotgun which Opal Genck fetched from the house when she discovered the snake.

Lee County, however, has never been noted for the special enormity and ferocity, of its reptiles. In fact the usual scarcity of big snakes made it something to write to the folks back home about when a 5-foot blacksnake or a huge timber rattler was destroyed.

When such a letter got back east and circulated among the relatives it was practically no time till they were all talking about the tremendous reptiles out in Lee county, Iowa, as one family living a few miles north of Fort Madison discovered years ago.

On old maiden aunt, a jittery old soul for whom snakes held a special fascination, arrived one summer from Massachusetts for a visit. First thing she did was to ask the hired man how long it would be before she got a chance to see one of our simply ghastly snakes she'd heard about, and were there any around the farm.

The hired man began hurriedly to assure her that Lee County was no Garden of Eden, and even the snakes and apples were second-rate, though the Eves were not; but before he got well started he noted the disappointment in her face and checked himself. Then he happened to see a 20-foot length of black water hose left by a stream threshing rig a few days before, which was looped along the fence where the engine man had hung it.

"Look!" exclaimed the hired man in a sudden burst of inspiration. "There on the fence. It's a regular old Iowa rubber snake. Probably been hanging around here for several days."

Aunt Emmie stared in delighted horror. At that instant for no known reason the end of the hose writhed up in life-like fashion and the whole 20 feet of hose slithered off the fence and into the weeds.

The family still remembers Aunt Emmie's wild shrieks as she stampeded for the house. They found her up in the spare

bedroom frantically throwing her things into the trunk, and it was with much difficulty that she was talked out of going back to Massachusetts then and there. Even after she saw the old rubber hose lying in the weeds beside the fence, she still half believed that the real snake had disappeared and the family put the hose there to calm her.

—AUTHOR PREFERS ANONYMITY

Archeology and Earth Science

by GEORGE A. MALOTT

WHILE ARCHEOLOGY is known as one of the social sciences, being a branch of anthropology, it is very closely allied to the earth sciences. I will attempt to detail the similarities and point out the great aid that the earth sciences can give to archeology.

The investigation of archeological sites depends on stratigraphy. As any geologist knows, it is of the utmost importance that the stratigraphic sequence be recognized in order to place any given formation in the geologic time table. It is likewise of the greatest importance to recognize the stratigraphic relationship of the various artifacts that may be exhumed in an archeological site. There is the same direct relationship of age in archeology that there is in geology. The oldest cultures and the oldest artifacts are found in the lowest layers beneath the surface.

The same problems of exceptions that vex the geologist also trouble the archeologist. One of the principal problems confronting the geologist is that of intrusions. It is also very common for this intrusive problem to trouble the archeologist. One of the most difficult things to decipher is the intrusive burials in an earlier mound or site. With practice and careful attention to detail it is possible to recognize the later disturbance of an archeological site and to determine that the artifacts found are intrusive and are of a later date than the main portion of the site.

Occasionally we have the reverse of intrusions of late artifacts in early sites and find early artifacts in late sites. The parallel of this in geology is thrusts and faults in which an early formation will be found over the later formation. In some of the archeological sites in the eastern part of the United States we find early artifacts that have apparently been found by an aborigine, used by him in his later culture and finally used in the grave goods or lost and buried in the middem with his late materials.

A knowledge of paleontology is a great help in the dating of archeological sites. It may not seem that the short time since man has been present on the American continent would see any change in the flora and fauna, but a great change has been and is still being made. At some of the earliest sites discovered on the American continent there have been found the remains of extinct animals such as the mastodon, camel, bison, and many others. In some sites which were occupied for a long period of time, or were occupied intermittently by different groups, we find a significant difference in the types and sizes of the mussel shells. It has been possible to detect a difference in these shells in as short a period as five hundred years.

There has been a great change in the flora also. Some of the sites which are now in desert country were in well-watered country when they were occupied. We find among the materials excavated at archeological sites many different plant types. One plant that is of American origin is maize.

In some of the drier sites it has been traced back through a great change. Through maize alone, it is possible to definitely state that widely separated sites are of the same relative age. Plant pollens are of value in determining the relative age of archeological sites because they will indicate a changing ecological environment, and these changes can be traced by the character of the geological sediments found.

In paleontology we have index fossils, and in archeology we have index artifacts. One of the most reliable of the index artifacts is pottery. The earliest pottery was very thick and had as tempering material vegetable fibers, grit or fine gravel. As the Indian gained skill in pottery making, through the passage of time, the pottery changed in style and materials. It became thinner and the tempering materials became finer in texture and eventually the use of grits, gravels, and the vegetable fibres was replaced by ground mussel shells, and in the Southwest by very finely ground pottery.

There was also a great change in the lithic artifacts. The very early projectile points were rather large. After the Indian invented the bow, he found that the large points would not do for his projectiles, so he was forced to make smaller points. The later in the time period the smaller the point, until the very latest points are the small triangular points which seldom are larger than one inch long and about half as wide.

We find many artifacts which are made of various minerals. A knowledge of mineralogy and the source of the minerals found in archeological sites is of great help in the unraveling of the trade patterns and contact of the Indian cultures. For instance we find many artifacts made of copper in a great many of the early sites. As the Indians had no knowledge of the reduction of ores, we know they traded widely in order to spread the native copper from its sources to the entire middle continent.

There are only a few places on the

American continent where galena is found; however, it has been found in archeological sites throughout the American continent.

The lithic materials from which artifacts were fashioned can be very certainly traced to the approximate source. However, there is still a great deal of work to be done in the analysis of the cherts and flints which the Indian used in their artifacts. It would be of immense aid to the archeologist to be able to say that at a certain time period a particular chert or flint was used by a particular culture or group of Indians.

There are a few classic sources of chert which were used by Indians for a period of time. One of the most celebrated of these is the Flint Ridge region of Ohio. This flint has been found in widely separated sites. We have found some of the ancient workings of the Indians that mined this chert. We have been able to reconstruct these workings and to determine the methods by which the Indian mined this very useful material. If some of the amateur mineralogists were to make an intensive study of this one phase of archeology, it would prove invaluable to the archeologist, both amateur and professional.

Geomorphology, which is one of the little known phases of geology, the study of land forms, could be of great value to the archeologist. Geomorphology is concerned with the erosion cycles and displacements through thrusts or faults or the raising and sinking of the earth's crust through isostatic balance. Most of the Indian sites are built on the second terrace of rivers or waterways. It is possible for the geomorphologist to estimate the time for a particular erosion or meander of a stream and thus give the archeologist an approximate time for a site. A few of the very early sites in the far west have been covered by volcanic ash, and undobutedly as time goes on more of these sites will be found. By projecting the erosion cycle of these sites backward, the geomorphologist can approximately date these sites.

In conclusion, it can be seen that the earth sciences are of great value of the archeologist and conversely the archeologist can be of aid to the geologist, mineralogist and paleontologist in the unravelling of the pre-history of the earth.

Geologic History of the Boulder Region

by ROBERT E. RIECKER

(Continued from last issue.)

DURING THE PERMIAN, widespread seas gave way to dry land, and the abundant rainfall of the early Pennsylvania was succeeded by Permian aridity.

JURASSIC

The topmost member of the Lykins formation appears to be transitional with the overlying early Jurassic age formations. There was a slight uplift of the eastern two-thirds of Colorado in mid-Jurassic time during which no sedimentation is recorded in the Boulder area. This unwarping is reflected by the erosional disconformity between the Ralston and the overlying Morrison formations. Seas invaded the region again in late Jurassic but their stay was short and most of the formation was deposited under fresh water conditions. During this time the entirely continental Morrison formation composed chiefly of white-pink sandstones, variegated shale and some limestone was laid down. A thin basal aeolian member, the Doctor Bond sandstone, is especially prominent north of Boulder.

CRETACEOUS

During early and middle Cretaceous time the Boulder area was slightly emer-

gent, or if under sedimentation, the thin veneer of early and middle sediments was eroded before the beginning of late Cretaceous time. The Dakota sandstone (basal member of the upper Cretaceous) disconformably overlies the Morrison foundation of late Jurassic age. Interpreted as being a basal deposit of a shallow epeiric sea slowly advancing over a subsiding shoreline, the Dakota marks the beginning of the last marine inundation to cover the Rocky Mountain area. The Dakota sandstone and associated rocks consist chiefly of well-washed sand and sandy shale, and usually have a thin layer of conglomerate at their base. The sandstone sections are primarily of beach deposit origin while the shales represent marine deposits. Locally, seams of coal and fire-clay occur. Since the sea was spreading over a very gently sloping surface on the old piedmont plain, the subsidence of the land favored the development of widespread swamps and probably accounts for the carbonaceous seams in the formation. Dakota massive gray sandstones and thick black shales form the first hogback of the foothills. The deposits of upper Cretaceous (Benton age) occupy a broad, shallow valley between the Dakota below and Niobrara deposits above. They are conformable with overlying and underlying formations. Composed entirely of marine deposits, the Benton formation represents further deepening and enlargement of the geosyncline in the Boulder area. Benton consists chiefly of dark gray shales with some sandstone and limestone.

PIERRE FORMATION (CRETACEOUS)

Pierre formation composed of 6,000 feet of gray marine shale and thin sandstone, represents the wide-spread and thickest of the marine upper Cretaceous sediments in the Boulder region, and also reflects the greatest depth of the depositional geosyncline in eastern Colorado. This formation lies conformably above the Niobrara.

The Pierre is conformably overlain in turn by the Fox Hills formation which indicates the beginning of the withdrawal of the marine waters from the Rocky Mountain geosyncline, for it is

the last definitely marine sandstone in the Cretaceous on the east side of the range. But, south of Colorado Springs, it is in part of fresh and of brackish water origin. Most of its outcrops extend out several miles from the foothills and contain some fossils. The Fox Hills locally is a beach sand. Its contact with the underlying Pierre shale is gradational in most places, for a definite lower limit is difficult to assign. The Pierre and Fox Hills formations constitute the Montana group within the Cretaceous.

The Laramie formation is the uppermost division of the Cretaceous in the Denver Basin region, being from 200-400 feet thick. Its deposits reflect fluvial, lacustrine (lake), and coal swamp conditions. It contains brackish, freshwater, and land fossils located in interbedded sandstones, shales, fire-clays, and coal beds. Marking the retreat of the dominating Cretaceous sea, the Laramie formation yields all of the marketable coal of northeastern Colorado.

LARAMIDE REVOLUTION

Towards the close of late Cretaceous time, parts of the Rocky Mountain geosyncline were subjected to folding, thrust-faulting, and uplift marking the beginning of the Laramide revolution. The great mediterranean sea basin which at its widest extent reached from central Utah to central Nebraska and Kansas, had received deposits of Cretaceous shales, sandstones, limestones, and coal in thicknesses ranging from 2,000 feet in the border area to 12,000 feet at Denver near the center of the basin. Filling and gentle elevation had brought the sea floor almost to sea level; far to the north and northeast there remained only brackish and freshwater lakes and lagoons. The mountain building process began as an irregular arching of this broad zone until the central portion reached an elevation of 5,000 to 6,000 feet (Fig. 7). Stresses accumulated in the central and western portions, and a line of weaknesses developed where the eastern foothills now stand. The mountain mass was thrust up dragging with it and steeply upturning the sedimentary rocks, which extended across the zone of weaknesses, far onto the upward moving mountain block. Along this zone of weaknesses the differential movement reached several thousand feet, and the rocks were stretched, folded, faulted and crushed. On the east side of the Front Range, bordering the deep Cretaceous basin, is an echelon arrangement of northwestward-trending folds, resulting in a north-south mountain range. Strong steep reverse faults and locally overturned beds frequent the edge of the Denver Basin between Denver and Boulder. Farther north the echelon northwest folds become asymmetric, with the steep sides toward the west, while many of the echelon folds are broken by faults that drop the west side. Commonly occurring along the crests and troughs of the northwest-trending folds, northwest faults become numerous while northeasterly faults of small throw frequent the sediments east and northeast of Boulder.

Accompanying this upheaval and continuing after the major movement had ceased, tremendous outpouring of lava covered great areas, along with intrusions of vast bodies of molten magma which did not quite reach the surface, and explosive volcanic eruptions which account for the thick ash beds in some areas (Fig. 8). The igneous activity recurred at intervals during Tertiary time, and the last outbreaks probably still were occurring as late as Pleistocene. Valmont Butte on the plains about four miles east of Boulder is a dolerite dike that cuts Cretaceous formations and is clearly a part of this major igneous activity. The Table Mountains at Golden, Colorado, about 15 miles south of Boulder, are capped by remnants of a flow of Eocene lava, and the dikes and sills throughout the hills to the west of Boulder also reflect this intense igneous activity.

EOCENE

The Arapahoe is intepreted as a representative series of alluvial fanglomerates composed chiefly of fine-to-coarse grained clastics, thinning rapidly to the south and southeast away from the highlands source. The basal conglomerate of the Arapahoe contains pebbles of all the older formations, including pre-Cambrian, and shows a small erosional unconformity with the Laramie. There is no evidence of a greater time interval between Laramie and Arapahoe than that between the Fox Hills and Laramie formations. The pre-Cambrian pebbles in the Arapahoe reveal deposition during the Laramide Revolution. The lower 500 feet of North Table Mountain lavas are of Arapahoe age, overlain by 700 feet of Denver formation lava flows.

The Denver formation, marked by widespread basal basalt-andesite conglomerates, gives the first clue of evidence of extensive volcanic activity in the rising Front Range area to the west. The sediments of this formation were derived from the erosion of the Front Range which was thickly blanketed (in areas) by andesite and basaltic lavas during very early Eocene.

Whenever periods of uplift were separated by relatively long periods of time, peneplanation of the Front Range reached a stage of late maturity or early old age. Erosional disconformities in the Tertiary sediments of the Denver Basin are related to the peneplanation levels in the Front Range crystalline rocks. Each disconformity is taken as evidence of renewed uplift of the Front Range and rejuvenated stream erosion, initiating a new cycle of erosion which resulted in the development of younger plains of denudation below the level of the older peneplain. It should also be mentioned that the igneous intrusion of the Tertiary is chiefly responsible for the present ore-bearing districts of the Rocky Mountains.

Erosion of the Front Range produced mature topography in the higher parts of the uplift before the end of Eocene time, and the Flattop peneplain developed over wide areas.

OLIGOCENE

Oligocene gravels overlapping the granite on the eastern slope of the Front Range indicate a

period of comparative aridity following one of humidity. During this time a second peneplain partially developed along the mountain edges.

MIOCENE AND PLIOCENE

Strong uplift, accompanied by volcanic action, rejuvenated erosion and the Rocky Mountain peneplain developed during late Miocene or early Pliocene time. By mid-Pliocene a broad belt on the eastern side of the range had been reduced to a gently rolling upland plain, and the higher parts of the mountains near the divide were carved into broad and deep valleys. Economically important enrichment of Eocene ores took place in the severe aridity of late Pliocene time.

PLEISTOCENE

At the close of the Pliocene or early in the Pleistocene, a marked uplift occurred in the Front Range, and soon afterwards the climate became cold and humid. Glaciers formed in the high mountains and in places descended to altitudes of 8,000 feet. This glaciation was followed by a warm dry interglacial period of long duration, during which the high terrace gravels of the Front Range accumulated to a depth of more than fifteen feet. Widespread glaciation marked the close of the Pleistocene, though it was probably less severe than the earlier period, as the glaciers did not descend below 8,500 feet. Ever since the uplift of the range in early Pleistocene, the rejuvenated streams have been cutting down the mountains and destroying the erosion surfaces. Spurs at differing valley levels indicate at least three distinct periods of valley widening and rejuvenation in 4-Mile Canyon just west of Boulder, due to successive halts in recent uplifts. Three mesa levels on the plains east of Boulder also reflect these halts.

This last chapter completes the past history of the geology of the Boulder, Colorado, region. It was a long and complicated history requiring more than 1,000,000,000 years to record. (Fig. 9 shows the present conditions of the Boulder region.)

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Midwest Club News

BERNICE WIENRANK, *Club Editor*
4717 North Winthrop Avenue
Chicago 40, Illinois

CENTRAL IOWA MINERAL SOCIETY reports that one of its members, M. L. Gilbert, learned that the hard portion of corncobs was being used to polish wood and metal products and decided to try it as a polishing agent for baroques. He obtained some of the corncob product, which has the appearance of high-grade corn meal, but is much harder than hardwood sawdust, and mixed ¾ gallon of it with ¾ pint of "Tide" and just enough water to cover the charge. This mixture he added to a tumbler full of baroques that were ready for their final polish. He was so eager to see the results that he opened the tumbler 24 hours earlier than was his usual custom. When he had cleaned the glimmering baroques, he discovered that they had a polish far superior to any that he had previously obtained on his tumbled stones. Anyone who is interested in the corncob product may obtain information about it by writing Mr. Stewart, 507 W. Park St. Jefferson, Ia.

*

JOLIET MINERALORIST SOCIETY was host to the Chicagoland clubs on October 7, for their traditional annual picnic and field trip to the strip mine area near Coal City, Ill. Nearly 60 cars made the trip and no one left without some specimens of the world-famous Mazon Creek fern fossils that are found in this locality.

*

MICHIGAN GEM AND MINERAL SOCIETY's exhibit at the Jackson County Fair last August was the most popular display at the fair. Visitors admired the beautiful gems and jewelry; were fascinated by the colorful fluorescent room, and showed great interest in the Indian relic display, which was dominated by an ancient Indian skull.

*

CHICAGO LAPIDARY CLUB on October 4 learned many short cuts in jewelry making when Lionel Simmons, who owns and operates the SS Precision Casting Co., which specializes in the lost-wax process of casting jewelry, gave the group a lecture on "Ideas in Jewelry Making."

*

INDIANA GEOLOGY AND GEM SOCIETY on October 12 viewed slides made from agates found in the Big Bend area in Texas. These unusual slides were made by Mrs. Sherman Minton, Jr., who cut the agates into slices ranging from .10 mm. to 1.0 mm. in thickness and inserted them into standard 35mm. frames. When the slides are projected onto a screen, they reveal beautiful details that are not ordinarily seen in the agates. Mrs. Minton gave the group detailed information on how to prepare the slides.

*

NEBRASKA MINERAL AND GEM CLUB has a handsome new cover for its bulletin, *The Rear Trunk*. The cover design, beautifully drawn, depicts a rockhound listening to "his master's voice," which is the earth science of Nebraska amplified through a horn coral. Truly this picture exemplifies the ancient Chinese proverb, "One picture is worth a thousand words."

*

EARTH SCIENCE CLUB OF NORTHERN ILLINOIS was scheduled to hear on November 9, Ivan Brunk, supervising meteorologist of the Chicago Weather Bureau, speak on "Our Weather." Mr. Brunk also planned to show two short movies, "Hurricanes" and "Tornadoes."

*

ISHPEMING ROCK AND MINERAL CLUB in each issue of its bulletin, *Jaspilite*, plans to feature one of the minerals found in the Ishpeming region. The September issue of *Jaspilite* carries an article on the iron ore, siderite.

*

CENTRAL ILLINOIS ROCKHOUNDS recently visited Macomb and Nauvoo, Ill., to collect geodes. In scouting this area, the group found a farmer who had just plowed a field and was paying to have the geodes hauled away!

*

MICHIGAN MINERALOGICAL SOCIETY on October 8 heard five experts discuss practical aspects of mineral collecting and preparation of the speciments for display. They were Charles Belanger, Wesley Mollard, Arthur Johnstone, Marion Lipinski and Walter Nickell. The discussion will be published as a pamphlet.

*

CHICAGO ROCKS AND MINERALS SOCIETY enjoyed an informal hour with Dr. Wilbur Hoff on October 13. Dr. Hoff, a research chemist in the field of radioactivity, discussed "Geology as a Hobby."

*

MINNESOTA MINERAL CLUB's meeting on November 9 was featured by William Bingham's demonstration of the science of identifying gem stones by nondestructive methods. He will give monthly lapidary lectures before the club again this year.

*

ST. LOUIS MINERAL AND GEM SOCIETY on October 5 had the opportunity to see the prize winning crystal models made by Rosser Brophy of River Mines, Mo.

NEWS OF OTHER SOCIETIES

MINERALOGY SOCIETY OF PENNSYLVANIA on October 14 visited the Limestone Products Co.'s quarry at Lime Crest, N. J. The limestone quarried at this site is metamorphosed limestone of the pre-Cambrian age, and minerals found in the

quarry include ruby corundum, fluorite, pyrite, serpentine, ruby spinel and tourmaline.

*

RAWLINS ROCKHOUNDS MINERAL AND GEM CLUB on August 14 heard Dr. Carling Malouf, archeology professor of Montana University, speak on the three periods of early man in Carbon county. The three periods of early man in this area, according to Dr. Malouf, were (1) Folsom, (2) Foragers and (3) Late Hunters. Dr. Malouf described the artifacts associated with each period and discussed the social problems affecting early man's migration.

*

VERDUGO HILLS GEM AND MINERAL SOCIETY recently heard Charles Danforth, instructor in mineralogy at Glendale College, give an interesting talk on "Mineralogy and its Related Sub-

*

ROCKCRAFTERS CLUB of the Lockheed Employees Recreation Club held its first annual Gem and Jewelry Show on October 27 and 28, in Burbank, Calif. Outstanding special exhibits included Mrs. Vivienne Dosse's prize-winning "thumb-nail" collection, carvings from William Phillip's collection, and a 4,000 carat smoky topaz. The color movie, "From Rock To Gem," was shown continuously.

*

GEM CUTTERS GUILD OF BALTIMORE recently was shown the motion picture, "Symphony in Stone," which depicts the processes that Donald Hord used in his carving of the "Guardian of the Waters." This statue is an heroic figure of an Indian woman pouring water from an olla. It stands before the Civic Center in San Diego and is made of silver-gray granite. Mr. Hord is internationally known and has twice won a Guggenheim Fellowship.

*

MIAMI MINERAL AND GEM SOCIETY owns a lapidary and silversmithing shop, where its members, governed by a set of rules, create gems and jewelry. Novices are given free instruction. At present it has four faceting machines, seven grinding wheels, two diamond saws, a vertical spindle unit for making spheres, three large laps and a belt sander.

*

ARROWHEAD MINERALOGICAL SOCIETY of Fontana, Calif., on October 8 heard Marion A. Speer describe his experiences collecting gold-bearing rhodonite at Siverton, and garnets near Salida, Colo.

"Thar's Gold in Them Thar Hills!"

(Many of the facts for this article were taken with permission from "Gold Guns and Ghost Towns" by W. A. Chalfant, and "Coronado's Children" by J. Frank Dobie.)

HAVE YOU EVER DREAMED of taking a gold pan, a pickaxe, and a mule and setting out—like the prospectors of '49—to find a fortune hidden in the rugged country of the West?

There are lost gold and silver mines there, and if you could find just one—you'd be rich, even after income taxes. Fact and legend, hopelessly intertwined, have come down to us about such glory holes as the fabulous Lost Cement mines of the California Sierras, of the Lost Dutchman mine of the Superstition Mountains in Arizona, of the storied San Saba silver mine of Texas, and of dozens of others.

On a bright morning in the middle of the last century, three German brothers found their way into the awesome Mammoth Valley of California. They plodded along—dirty and tired—saying little because each breath was a strain. They had been attacked by Indians on the plains and had climbed into the mountains for safety. A doubtful safety, this! Each step over the sharp rocks was torture. The country was forbidding, ringed with volcanic cones. The air and even the earth were warm, and just a while before they had passed a geyser of boiling water that shot 80 feet into the morning air.

Finally it was time to stop. The sun was setting, and the foaming creek (the Owens River) had comes to its head. A narrow ledge nearby would serve as a fortress and a camp. One stood guard, and the others prepared to sleep. But wait—they took their pickaxes and began breaking up the rock excitedly. Could this be gold? One said yes, but the others laughed as he carefully put a sample of ore into a bag and went to sleep with it cradled under his head.

Rockslides, animals, and Indians—the mountains took their toll. Only one, the one with the ore, came out alive, and even he was half dead as he struggled into a mining camp on the west slope.

San Francisco was his next stop, his eyes bright with fever. He was dying from tuberculosis. Wasn't it ironic that he couldn't even pay the doctor bill when there was a fortune—vast millions—at his fingertips? But perhaps this rich vein of gold wasn't lost, for—unable to produce a penny—he gave his physician, a Dr. Randall, a treasure map.

Our German friend was dead. But his secret was in eager hands. Dr. Randall got together a crew of prospectors, including one Gid Whiteman, to go back to Mammoth Valley. Gid was dogged in his search. He and his eleven men dug up 160 acres looking for the vein—searching endlessly for the rock ledge. They found nothing. But they wouldn't give up—goaded on

(Continued on page 30)

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by samples of ore given to Dr. Randall by the dying man. These were a reddish cement, richly flaked with gold. Oh, they had found the red cement, tons of it, but where was the gold?

Suddenly there was mutiny in the ranks. Three of the men grumbled that they weren't going to stay around any longer in this place—where rocks floated and bits of wood sank. The rocks, of course, were the light volcanic lava, and the wood was from the mountain mahogany.

Gid Whiteman didn't see through their flimsy excuse or—if he did—he said nothing. So the deserters left camp, ostensibly headed back to civilization, a town named Aurora. Actually they rode just out of sight, then turned about face and came into the valley from another direction. One of them, an unnamed German, had found gold. After some haggling, he and his companions, one Van Horn, and a third person, unidentified, had decided to strike out on their own.

The three took thousands of dollars of gold out of their find before the inevitable happened. They were having breakfast one morning when Indian Chieftain Joaquin and 30 of his braves came into the camp, stripped them of their clothing and horses, and ordered them to leave or be killed. They left, telling each other they would come back after the Indian warfare quieted down. Van Horn said later that he didn't go back, but the other two did. Two skeletons found later in the vicinity told a mute story. Before he died, Van Horn told others about the claim, and they too hunted in the valley but came back penniless.

A man named Farnsworth bragged to prospectors in Monoville that he had found the vein in 1861. He hired a helper to go out with him to work on the claim, but he returned alone. Then later a Nevadan named Robert Hume offered to put up enough money for a small mill. Farnsworth and he went to inspect the possibilities, and later Hume's body was found. He had been murdered. The finger of suspicion was pointed at Farnsworth, who disappeared.

Later still, two men—Kent and McDougall—were said to have found rich diggings in the valley. It was whispered that one of them was Farnsworth, who had changed his name and returned years later. Whoever he was, he covered his diggings so well that no one has found the hole.

Naturally, prospectors came by the droves. They combed the valley, and—although it was generally agreed that there had been a rich mine there—none could find it. Perhaps a landslide had covered it. Perhaps some day a summer tourist not even looking for gold, will chance upon a fortune.

It is believed the Indians knew about the gold. Tribesmen kept roaming into mining camps for years with reddish cement dotted with gold. But if they knew, they kept their secret well.

The Lost Cement mine is no more mysterious than the Lost Dutchman mine. This is hidden somewhere in the folds of the barren Superstition Mountains. Few who enter these hills come out alive. There is no water.

The Indians believed the old man of the mountains lived there, and they bitterly resented white men invading his quarters. But one did—a Dutchman—who came out with quartz rich in gold. Many tried to follow him to his stake, but they learned nothing, for the Dutchman died on the way.

The story of San Saba is filled with Spanish conquerors, wild Comanche Indians, and such Texians (they used to use the i) as James Bowie, who died at the Alamo after a life filled with adventure and exploration.

The first man to report the San Saba was a Spanish soldier—Don Bernardo de Miranda, lieutenant general of the province of Texas. In the winter of 1756—just 20 years before the American Revolution—this adventurer set out with a handful of soldiers and an Indian interpreter on orders to investigate the mineral riches of the country.

After traveling eight days northward from San Fernando, now San Antonio, the weary little group camped on the Arroyo San Miguel, now called Honey Creek, a tributary of the Llano River. In a nearby hill Miranda found a cave. After prospecting the inside, he came out with this exciting report:

"The mines which are in the Cerro del Almagre are so numerous that I guarantee to give every settler of the province of Texas a full claim. . . . The principal vein (silver) is more than two varas in width and in its westward lead appears to be of immeasurable thickness."

Returning home, he met a friendly Apache Indian who told him there were even better mines on the Colorado River. Back in San Fernando, the Spaniard had a sample of ore assayed, and it ran at the rate of about 10 ounces of silver to the hundredweight—a good showing.

Miranda suggested that the governor set up a garrison of soldiers to protect the rich mines and asked that he be placed in charge of the presidio—a nice spot to make a fortune. The presidio was set up in time, but Miranda, meanwhile, was sent off on another jaunt.

From the beginning the Comanches took a fierce dislike to the Spaniards. First they burned down a mission and killed those stationed there. And eventually, they forced the fort to be moved. What happened to the mines is lost to the records. It is believed that the Spaniards had been working them and taking loads of silver to Mexico. There are still remnants of a road, which interestingly enough follows the high points on the land . . . probably as a vantage point against the Indians. The road is called Silver Trail.

Wherever cowboys gather and campfires burn, you will hear stories of how one person or another found the lost silver and died with the secret.

(To be continued in next issue)